Crime Mapping News

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The topic of this issue is implementing crime mapping into a police department. Our goal in presenting the following articles is to help those who are looking to implement crime mapping and to help those who may have already begun the process.

We would also like to announce that the Police Foundation's Crime Mapping Laboratory has a new Director. Dr. Rachel Boba comes to us from the Tempe, Arizona Police Department where she was a crime analyst for nearly five years. Rachel hopes to bring both her academic and practical experience to the world of crime mapping. For information on how to contact Rachel or other members of the Crime Mapping Laboratory, see page 8.

Implementing a GIS Application: Lessons Learned in a Law Enforcement Environment

by Col. Ken Hughes, Jefferson Parish Sheriff's Office

I. Introduction

This article describes the primary issues that must be addressed for the successful development, implementation, and use of a law enforcement geographic information system (GIS) application. This paper is presented from the viewpoint not of an academician but rather of a practitioner. The Jefferson Parish, Louisiana Sheriff's Office (JPSO) has successfully developed and implemented a comprehensive law enforcement GIS application for the benefit of both agency personnel and the community it serves. The path to accomplish this has been rigorous. We have made many mistakes and learned much through our initiatives. The thoughts and ideas expressed herein are essentially a chronology of the events and issues addressed by our agency in our GIS initiative.

II. Project Design

Without a doubt, an *effective* design is critical to the successful implementation of a GIS application. You would not consider building a high-rise structure without the appropriate plans and specifications. Likewise, you should not embark on developing a comprehensive, complex information management system with a geographic interface without suitable specifications. Primarily, the geographic infrastructure must be addressed. The geographic infrastructure is an illustration of your community or service area. Streets,

Note from the Editors: *The opinions expressed in the articles of this newsletter are those of the authors and do not necessarily reflect the views of the Police Foundation or the COPS office. In addition, only light editing has been done to the articles in order to keep each author's voice and tone.*

Inside this

community facilities, neighborhoods, and law enforcement reporting areas must be identified. These items are critical as they provide the geographical reference for the illustration of data points. If appropriately structured, any data contained within the records management system (RMS) can be illustrated for reporting or analytical purposes. Underlying the geographical features are address ranges. While you think you might know the appropriate address ranges for every street or street segment within your community, you will be surprised what happens when you begin your geo-referencing process. Accurate street names, aliases, and address ranges are essential for the location of data items on your mapping system. Data can be accurately related to the map only if there are corresponding links between geographical references in the data record and all geographical features on the map.

With the geographic infrastructure established, data and system interfaces must be identified to provide information (data records) to the GIS. Systems such as 911, computer aided dispatch (CAD), and records management systems (RMS) are typically the primary source of records for the GIS. Additionally, the GIS should be able to use information contained within incident reports. The GIS can be structured to be a comprehensive tool to assist an agency in the management of incidents and personnel.

As an agency begins to prepare for the GIS design initiative, several important issues must be addressed. The depth of the application, its purpose, employee training requirements, and desired reports and maps are crucial to define in the early stages of the project. The depth of the application relates to the extent of the interface between an agency's RMS and the mapping application. It is relatively easy to identify key records for illustration within the GIS. However, if an agency intends to map other types of data that have geographical references, then significantly greater requirements must be addressed by the interface between the RMS and the GIS application.

A fully developed GIS application can have multiple uses within a law enforcement agency. Area and neighborhood analysis, evaluation of trends, crime reporting, problem solving, and predictive modeling can be accomplished by a comprehensive interface between the RMS and the GIS application. Additionally, automatic vehicle locator (AVL) technology, undercover operations, and investigative work can be supported through the well-structured GIS application.

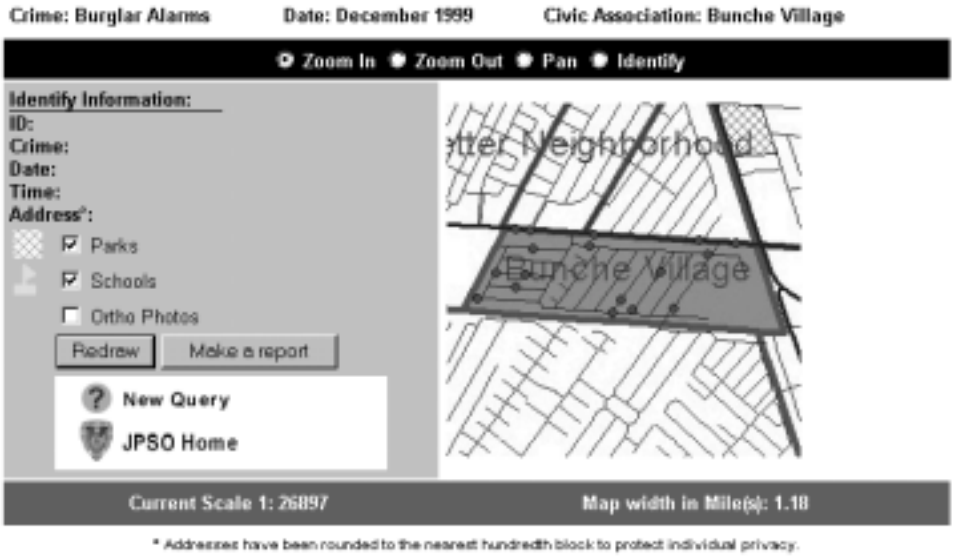
In addition to the in-house applications, an agency must define what external access is desired for the GIS system. The same record set used internally can support external reporting by citizen groups, civic associations, or the news media. Community-based reporting can be accomplished effectively through reading a selected set of records within an agency's RMS and out-putting reports and maps to the Internet. The development of a web interface to the GIS offers interesting possibilities for a law enforcement agency that wants to enhance and expand communications with the community.

Another important element of the design initiative is the determination whether the GIS application will be illustrative or interactive and used as an investigative tool. There are significant considerations that must be addressed if a true spatially-oriented GIS is to be implemented. As with many other technological solutions, the more robust the underlying application, the greater the extent it can serve within an agency. However, as with many other similar technological solutions, the greater the complexity, the greater the cost. As part of this evaluation, an agency must identify whether or not the GIS is to be integrated into the primary RMS or an independent program. Viewing tools, data illustrations, and underlying operative software must be defined prior to the construction of the system. If the GIS is designed in a comprehensive and robust manner, it can support multiple applications. However, if the application is designed as a viewing tool, it cannot be easily upgraded to address full integration into an agency's RMS. So the decision to integrate the GIS into an agency's Local Area Network (LAN) or make it accessible solely through a web browser is one that should be addressed early in the process.

III. Implementation

Initial developmental activity should focus on in-house applications. These are the broad agency programs that are used to illustrate key data fields in the

Sample Map from the Crime Tracker Program



RMS. Specific internal applications should address reporting at the district and sub-zone level, case management for the detective bureau, and AVL systems. If a solid foundation is built so that these applications can be handled efficiently, an agency will not have a problem expanding the GIS to address external requests. Such external issues could be community-based reporting with a web interface. The external applications would produce maps and reports based on a subset of the data that are used to support the more extensive and robust internal applications.

An agency must view the GIS as a data management application. In reality, the GIS is simply the graphic illustration of data elements. Accordingly, with the appropriate (accurate) infrastructure established to reference geographical features, the system is ready for the import or input of data. To accomplish this, a plan for the conversion of legacy data must be established. Data should be either migrated or converted for use within the GIS environment. As a plan for this migration is established, it is imperative that database access, size, and system interfaces be established and managed effectively. The GIS application demands extensive processing capability. Therefore, the selective evaluation of data sets to minimize processing requirements will significantly improve response times for individual users. This is of great importance as *speed* is the key to user satisfaction.

As datasets are established and managed for efficiency, primary emphasis must be placed on maintenance of the graphic interface. All data must have some form of geographical reference so that images can be created within the GIS. With geographical references and the appropriate graphic interfaces maintained, the GIS can become a very important and beneficial tool for a law enforcement agency.

IV. Agency-Network Infrastructure

When a law enforcement agency deploys a GIS application, significant consideration must be given to user access. A GIS application can function as a stand- alone program or operate within either LAN or Wide Area Network (WAN). Because of the amount of data required for the effective use of the GIS application, network configuration and capacity are a primary consideration in the design of the application. The broader the scope of the GIS project, the greater the needs for data access. Additionally, desktop access is driven by security issues. Clearly, an agency does not want to allow all personnel access to all information within the GIS application. Since some data are sensitive to ongoing investigative work, desktop access must be defined and limited according to individual user rights. Furthermore, depending on how the GIS application is deployed, software licensing issues must be addressed. The deployment of a full GIS application on every desktop is an expensive proposition. Full GIS deployment can significantly increase the cost of implementation because of licensing fees and residual support and maintenance requirements.

An alternative to full deployment of the GIS on every desktop is an Intranet/Internet solution. Primary GIS applications can be developed in a browser format using object oriented programming. By doing so, copies of the GIS can be distributed throughout the department or to outside sources using a simple Internet browser. In such instances, security and firewalls to protect the inherent system must be addressed. Furthermore, since all such processing is performed at the server level, bandwidth (network capacity) becomes a consideration. As part of the security and bandwidth considerations, the user agency should decide whether the GIS would hit real-time data or views of data from established tables. Real-time data access mandates a very sophisticated data sharing and network configuration. Additionally, security considerations are increased since multiple users have access to primary

data sources. For the most part, the use of datasets replicated from primary sources facilitates the security and bandwidth issues.

V. Personnel Issues

Unquestionably, the GIS application is as good as the people using it. Regardless of the level of sophistication offered by the program, if the user is unskilled, the program will not be beneficial. GIS development is a very complicated and demanding professional exercise. It is unlikely that a law enforcement agency would have the requisite skill set on staff to build the initial application. However, once built, the application should be structured so that agency personnel can maintain and use it effectively. To accomplish this, training is required for the GIS concept and for the specific application. Additionally, the identification of primary data elements and their maintenance over time is of paramount importance to the successful implementation of the project. In-house personnel who are trained in GIS development, maintenance, and database administration become valuable. In fact, they are so valuable that it is difficult to retain them. Such individuals have multiple job opportunities. Accordingly, as personnel are trained in the use of the GIS applications, it is important that the department recognize the need to retain highly skilled employees.

> "...the most important lesson learned is that the development and implementation of an agency wide GIS application is…[a] process of change and refinement."

The requisite skill set to maintain the GIS over time includes not only graphic capabilities but also database administration, programming, and a fundamental understanding of networking, file sharing, and security issues. Most likely, any agency considering the implementation of a GIS application will look to outside consultants for assistance. Outside consultants offer a broad skill set and a sense of direction and mission in the accomplishment of the project. However, this comes with a price. Qualified outside consulting services can be expensive. On the other hand in some cases, they are only paid if they are successful. In the final analysis, an agency will likely have a combination of both inside and outside technological resources for the GIS project.

VI. Cost and Financial Issues

A GIS can be expensive. In-house data systems have to be fine-tuned and maintained to produce the type of information required for use within a GIS system. Additionally, the technological infrastructure of an agency and resource data must be continually updated to ensure that a seamless interface between systems can be maintained. This requires competent and knowledgeable personnel and a reliable LAN with suitable capacity. Investments in hardware and software will likely be necessary, and some provisions must be made for ongoing support.

Working through the National Institute of Justice (NIJ), an agency can find assistance and guidance in the development of a GIS application. There has been a significant amount of application development completed in the public domain that is available to agencies interested in the establishment of this type of capability. However, while the software may be in the public domain, all other preparation required by an agency will likely come at cost, as will the establishment of the underlying the geographic infrastructure. The implementation of a GIS application is neither inexpensive nor something that can be accomplished on a short-order basis. An agency must address the commitment required prior to initiating the development of such a system.

VII. Lessons Learned

There are many lessons to be learned in the implementation of a GIS application. However, the most important lesson learned is that the development and implementation of an agency wide GIS application is an iterative process. Issues relating to users, data management, application distribution, security, etc. will continually reshape the design of the initial project. Essentially, the resulting application becomes one which is truly customized to the agency's needs and operating routines. This process of change and refinement continues through implementation and deployment.

Interested users will continually suggest changes and additional routines to make the application more effective and beneficial. Of all lessons learned, the following are the most important:

- ***Iterative Process*** – The GIS application will continually evolve in design, development, implementation, and use. The GIS application must be structured to promote and insure complete flexibility.
- ***Keep It Simple*** – There is great wisdom in this common phrase. The GIS application must be kept simple so that the ordinary law enforcement officer can benefit from its use. If a skilled technician is required to operate the GIS application, it will have minimal benefit to an agency as a whole. Admittedly, skilled technicians are required for advanced applications but the officer on the beat has much to gain from the reporting and mapping capabilities available in the GIS environment. If the application is kept simple, the officer will use it and benefit from the information contained therein.
- ***Pre-formatted Maps and Reports*** – The ability to generate data reports and maps illustrating specific instances is very important to the usefulness of the GIS application. Establishing pre-formatted maps and reports as a menu option will greatly assist in the deployment of the GIS application.
- ***Direct Link to RMS*** – The ability to move from an incident illustrated on a map to the agency's records management system is of significant importance. If the GIS application is to be used for investigative purposes, a direct link to the RMS is crucial.
- ***Distribution*** – Designing the GIS application so that programmatic and data updates can be distributed efficiently is of critical importance. While the application will be maintained on enterprise servers, programmatic and data updates must be available to users throughout the system. This includes officers stationed in remote locations. Accordingly, the application must be designed to facilitate the efficient transmission and installation of new programmatic routines and datasets.
- ***Web Interface*** – The GIS application should be designed to support a web interface. By so doing, community-based reporting and mapping can be implemented as a derivative of an agency's GIS initiative. This will result in significant community support.
- ***Current Data*** – For the GIS application to be of benefit to an agency or of interest to the general public, information must be maintained in a current fashion. Accordingly, an effective interface must be designed and implemented between the GIS application and an agency's enterprise database.
- ***Training and User Support*** – For the GIS application to be appreciated and used in a beneficial manner, effective training and user support must be delivered. While the application should be designed to benefit the common officer on the beat, it does represent new technology and a different way of handling incident-based reporting. An agency must make a commitment to provide continual training and user support.

The lessons learned are an important part of the implementation process. Project managers from an agency must be observant and listen to comments from users and the general public relative to the GIS application and its effectiveness. For the application to be beneficial, it must respond to the requirements and expectations of the user community.

VIII. Benefits

With all of this having been said, *why develop a GIS?* Well, the answer is simple. *It is worth it.* The ability to attain a geographical perspective of incidents and people within the community is a great benefit to law enforcement agencies. Not only does it help in reporting and investigative initiatives, it also helps in establishing credibility within the community. Having the ability to produce an easy-to-read map relative to activity in a citizen's neighborhood is a great benefit to the individual, the associated community, and the police department. Additionally, the visual perspective of data helps law enforcement officers understand what is happening in a community and enables them to spot trends and provide remedial or corrective measures.

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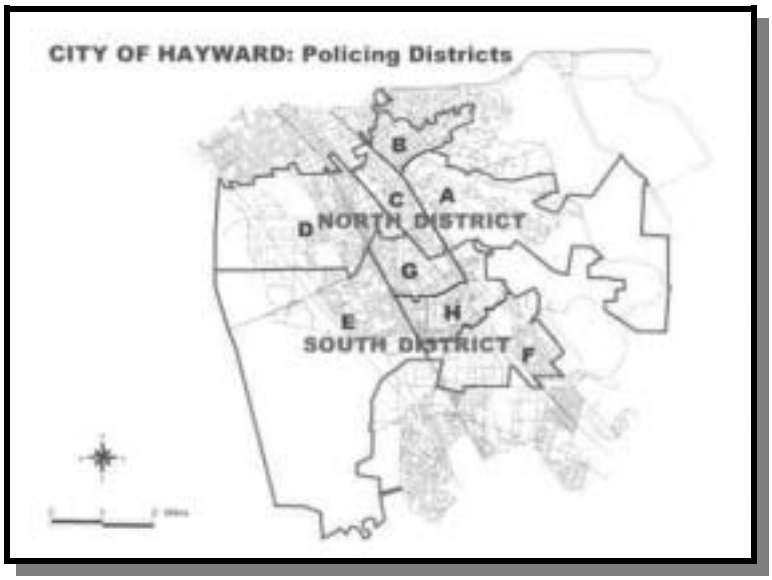
Implementing Crime Mapping:

Hayward Police Department
by Karen Vincent, Crime Analysis Manager

The City of Hayward, California is home to 127,700 residents and covers over 37 square miles. The police department employs 187 sworn and 117 civilian personnel, and the city is divided into two community policing areas which house a total of eight police beats. When the Crime Analysis Unit at Hayward Police Department was first created in January of 1998, an assessment was necessary. We asked the question: How can we use crime analysis to provide the best service to the community? Technology and mapping became top goals.



Our first step was to determine our assets. Mapping had been a goal for many years, and past mapping program attempts had drained the pockets and spirits of everyone involved. These tribulations made everything worthwhile when we found we already had the tools to begin. My search for assets revealed an individual license for ArcView 3.0 and street and boundary files for our city. Within an hour, we produced our first map of Hayward.

Computer aided dispatch (CAD) and records management system (RMS) data were our first choices. In 1998, the process was under way to change RMS vendors. Our system was structured with CAD calls directed to the management information system (MIS) for storage and reports. Data could be taken from MIS or RMS for use with a mapping program.

However, the system we were using at that time had seen much wear. It was built many years earlier, and it not only had very few options for data retrieval but also contained inaccuracies resulting from hardware and software issues. It quickly became clear that daily access to MIS and RMS data in the Crime Analysis Unit was not a feasible way to provide mapping.

We started looking at other options. While morale was still high, we settled on a solution: a little-known database with much potential existed in the investigations bureau. It was a small Paradox-based case management system with a separate table for each Part I crime type. The tables included important analytical information like report number, date, time, location, MO, suspect description, type of location, and miscellaneous details. We only needed to query the tables for our time period of interest and export them in the correct format for ArcView. At last, we had our first crime maps.

Now we faced the issue of format and distribution. These long-awaited analytical tools could be displayed on bulletin boards, stuffed in boxes, produced as transparencies, or created on larger paper sizes, perhaps with a plotter. Eventually all methods were tried, and some were more exhausting than others. One fact became clear: printing multiple copies of maps and placing them in mailboxes can be a time-consuming chore. We knew that technology had a better answer.

As you know, we planned heavily for a new RMS and MIS system. Part of that planning involved building an infrastructure for a department-wide Intranet. The process involved increasing the number of PCs available and creating Netscape Browser access for all departments and units. This was to be our platform for distribution.

Our first step was to create a Crime Analysis Unit Intranet web site, using HTML. An Intranet web site is a secure web site that only police department personnel access whereas an Internet web site is available to the public. It was important for us to use an Intranet web site to protect our data and restrict access.

Because we were interested in publishing our maps via the Intranet, I began experimenting with low cost options. The computers in our Crime Analysis Unit were equipped with Microsoft Office, which comes with web-publishing capabilities. We used ArcView to export our maps in Windows Metafile Format (.wmf). Then we opened Word, centered our text information, and inserted the map picture. Once the presentation had met with our satisfaction, we chose "Save As HTML" from the file menu.

Our maps were available throughout the department. They were accessible for printing 24 hours a day seven days a week, but the best was yet to come. As the popularity of our maps increased, we decided that mapping capabilities needed more flexibility and more accessibility within the entire department.

In our constant search for cost-effective options, we found an option that was free; ArcExplorer by ESRI. ArcExplorer is a lightweight version of ArcView that allows users to create maps based on their own needs using the ArcView shape files created in the Crime Analysis Unit.

To implement ArcExplorer, we needed five things: a data warehouse, connections to the warehouse, ArcExplorer on every PC, a training program, and effective marketing. The data warehouse was built as we collected shape files for city characteristics, boundaries, crime types, suspect locations, and target establishments over time. I chose a drive on a PC in the Crime Analysis Unit to hold the warehouse and act as a server for the shape files. I created a folder called "Mapping Files" with subfolders for each category of information. Within these subfolders I further subdivided information by calendar year and time aggregation (e.g., monthly, quarterly, yearly). The warehouse grew rapidly and new categories were added with every suggestion. In preparation for widespread use, I enabled the sharing properties and write-protected the Mapping Files folder.

With the warehouse established, it was time to install software and make the connections. ArcExplorer is licensed free of charge and is available from the ESRI web site (http://www.esri.com/company/free.html). As the software was installed on each machine, a network drive "M" (for mapping) was designated on that machine, connecting it to the Mapping Files folder. Within five minutes each machine was prepared.

To market this, I began a campaign in our Crime Analysis publications and through departmental e-mail. This new tool was appealing because it was ready after five minutes of installation and five to ten minutes of training. Fortunately, ArcExplorer is fairly user friendly. The training entailed five minutes of directing the user around the program, a few minutes answering questions, and giving a "cheat sheet" of basic commands to help the user in the future. After this initial training, I simply made myself available for further questions. The largest obstacle was convincing users to play freely and not worry about "breaking" anything. After a month and a half of part-time installation and training by appointment, everyone had mapping at their fingertips.

We had reached another goal, but mapping is a continual process. With the basic infrastructure of a good mapping program in place, it was time to add new perks and re-address old issues.

To enhance our capabilities we explored the option of adding photography. We joined with other city offices to purchase orthophotography for Hayward from an ESRI reseller. The photos were pre-prepared and ready to use with ArcView "out of the box." Immediately, the photos became a great asset for investigations, warrant services, drug busts and emergency situations. During the photo purchase process, our connection to the other mapping offices of the city strengthened, and we agreed to share data more freely. This agreement led to a new section of our warehouse, which held parcel data, census data, and other geographic features of our city. We also extended ArcView to expand our capabilities by adding ESRI's Spatial Analyst and ArcPress extensions. Soon, we will have ESRI's Image Analysis extension as well.

Example of a Hayward Aerial Map

However, a final issue remained. We still did not have access to CAD or RMS data for mapping purposes. To remedy the situation, we began to negotiate an extension to our new MIS and RMS that would allow the crime analysis unit to query information from RMS, MIS, and the jail system. We purchased a query extension from our vendor that will be delivered shortly after the arrival of our new system and will provide the access we need.

The implementation of a mapping program within a police department is an ongoing process. We began by assessing needs, identifying assets, determining data options, making necessary purchases,

and deciding formats and frequencies. Before long there was a thriving program that resulted in exciting new options and ideas.

With perseverance, a mapping program can be implemented in a relatively short amount of time, and there are many resources to aid in its development. Among others, email lists, such as ArcView-L (http://www.esri.com/usersupport/index.html) and CrimeMap (http://www.ojp.usdoj.gov/cmrc/) provide information, ideas and support, and ESRI offers low-cost or free training opportunities via their virtual campus and regional training centers (http://www.esri.com/training/index.html).

Implementing a crime mapping program can be an arduous task. Decisions have to be made regarding sources of data, mapping software, departmental needs, and available assets. We were pleased to discover, however, that there is a broad array of resources readily available on the Internet and from major vendors. We hope you can benefit from our experiences as you build your own crime mapping program.

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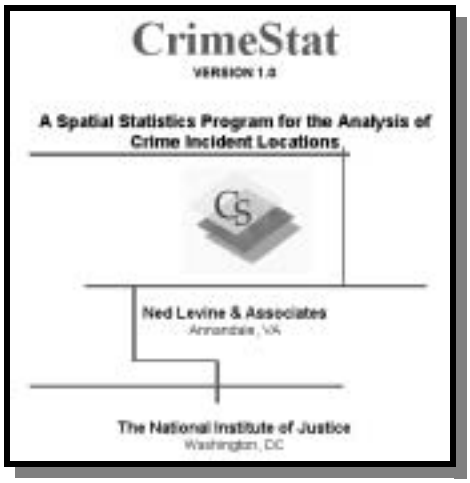


CrimeStat: A Spatial Statistics Program for the Analysis of Crime Incident Locations by Ned Levine, Ph.D.

CrimeStat© is a spatial statistics program for the analysis of crime incident locations. It is a stand-alone Windows-based program that was produced for the Crime Mapping Research Center, National Institute of Justice, Washington, DC.

CrimeStat can interface with most desktop GIS packages. It can read ASCII, Dbase, and ArcView shapefiles. It calculates statistics in tabular form but can also output various statistics as graphical objects to several GIS packages: ArcView, MapInfo, Atlas GIS, Surfer for Windows, and ArcView Spatial Analyst.

The program is multi-threading which allows it to utilize dual-processor computers and has dynamic data exchange (DDE) code which allows it to interface with other Windows-based programs. The Regional Crime Analysis GIS package, being developed by the Criminal Division of the US Department of Justice, has a dynamic link to *CrimeStat* (See http://www.npr.gov/library/papers/bkgrd/crimemap/section2.html).

The program takes as basic input the X/Y coordinates of a set of points (e.g., crime incidents). Weights or intensities are allowed, but are optional. For example, if the location is an individual crime incident, normally there would be no weight or intensity. However, if the location is that of a police station, then the intensity could be the number of calls for service in a month. Secondary files are also allowed. For example, if the primary files are the locations of street robberies, then the secondary files could be the centroids of census block groups with the population being an intensity variable. This flexibility allows many different types of variables to be analyzed using *CrimeStat*.

The program can read points using either spherical (latitude/longitude) or projected (feet/meters) coordinates. It can also calculate distances as either being direct (shortest path between two points) or indirect (traveling either horizontally or vertically).

The following is a brief summary of the four sets of statistical routines in *CrimeStat*. A complete description can be found in the program documentation.

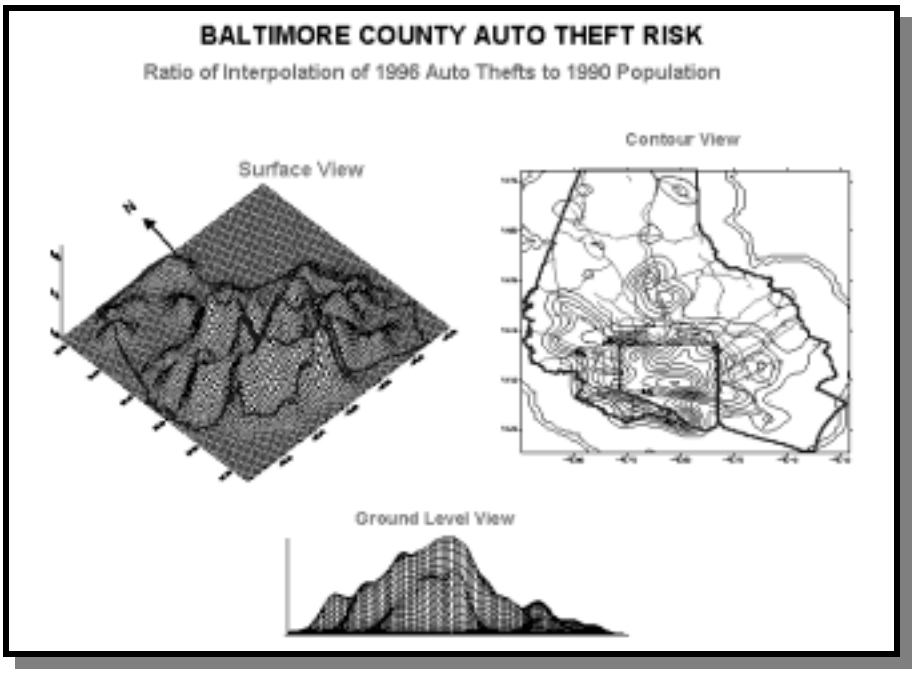
Spatial distribution. The most basic type of spatial analysis is to describe the overall spatial distribution. *CrimeStat* has several statistics for describing the spatial distribution of a set of points (i.e., incidents): mean center, standard distance deviation, standard deviational ellipse, directional mean, and two spatial autocorrelation indices.

Distance analysis. Distance analysis is useful for analyzing whether there is clustering in the incident distribution compared to a random distribution. *CrimeStat* has a number of distance statistics that are useful for identifying clustering patterns: nearest neighbor analysis, linear nearest neighbor analysis, and Ripley's "K" statistic.

'Hot Spot' Analysis. 'Hot spot' analysis is important to identify concentrations of incidents. These can help shape interventions by focusing police and community resources on areas with many incidents. *CrimeStat* has three routines for identifying 'hot spots': hierarchical nearest neighbor clustering; K-means (partitioning) clustering; and local Moran statistics.

The project was supported by Grant No. 97-IJ-CX-0040 awarded by the National Institute of Justice, Office of Justice Programs, US Department of Justice. Points of view in the program and documentation are those of the author and do not necessarily represent the official position or policies of the US Department of Justice.

Interpolation. This is a method for generalizing from a point distribution to an area. It is useful for modeling the likelihood of incidents as well as the relationship between incidents and underlying 'risk' variables. The interpolation method *CrimeStat* uses is the kernel density method. *CrimeStat* has two kernel density estimation routines, with several parameters that can be modified in each: a single-variable interpolation and a dual-variable interpolation. For example, the figure on this page shows a dual-variable interpolation in which the kernel density estimate of motor vehicle thefts in Baltimore County and Baltimore City during 1996 is divided by a kernel density estimate of 1990 population, producing a rough 'risk' measure of vehicle thefts per capita.



The program can be downloaded for free from the Crime Mapping Research Center (CMRC) web page: http://www.ojp.usdoj.gov/cmrc. There is also a manual that explains the statistics in the program and gives examples of their use. There will be periodic updates to the program and users should check the CMRC web page for more information. The next update will feature additional spatial distribution statistics (geometric mean, harmonic mean, directional mean) and a journey to crime estimation routine for identifying the likely residence location of a serial offender. The program is copyrighted and users are expected to cite the program in any report or publication in which it is used.

*Ned Levine is president and founder of **Ned Levine & Associates** of Annandale, VA. He can be emailed at crimestat@nedlevine.com.*

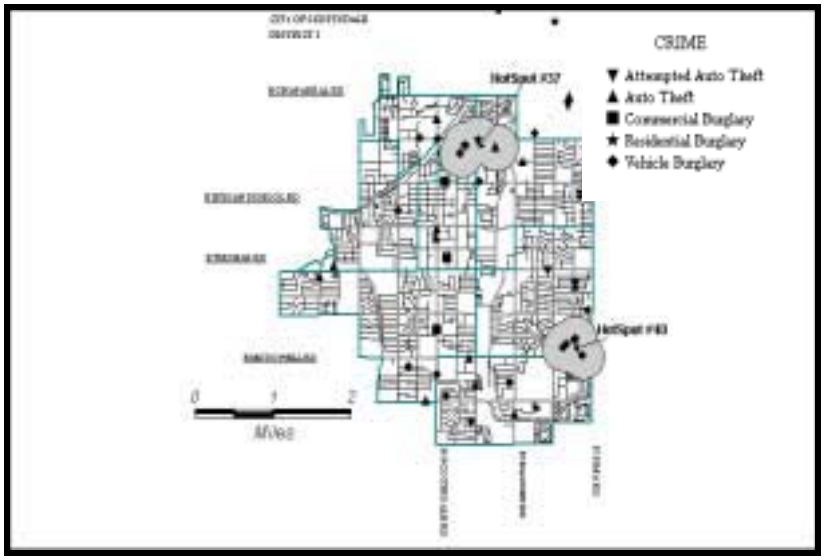
Mapping in Action:

Scottsdale Police Department: Starting Up Crime Mapping

by Paul C. Bentley, Crime Analysis Supervisor

Introduction

The Scottsdale Police Department's Crime Analysis Unit (CAU) was developed as many CAUs have been, on one person's initiative and with government money. In the early 1990s, the planning analyst saw the benefits of crime analysis and took it upon himself to write a proposal identifying the tools needed for crime analysis. He submitted it to the Criminal Justice Enhancement Fund (CJEF) and was successful in obtaining funds for a personal computer, a color printer, and software. Once the equipment was purchased, six volunteers were coordinated to enter residential and commercial burglary data from departmental reports into a database and produce a monthly bulletin that included beat comparisons and a listing of all the residential and commercial burglaries for the month. The work of the volunteers and the reports they produced were instrumental in the justification for and hiring of a full-time crime analyst in 1995.



When I was hired as the new crime analyst, the CAU did not have access to a records management system, the computer aided dispatch (CAD) data, statistical software tools, a database manager, or an automated database. Subsequently, three initial objectives were identified as paramount in creating a full-functioning CAU: 1) define what members of the police department expected and needed from crime analysis; 2) build an infrastructure of information (data) and technology; 3) build rapport with the city's GIS division to obtain the necessary geographic information.

In order to fulfill the first objective, a crime analysis user committee was created and included myself and personnel from patrol, investigations, communications, and special operations. The group prioritized the objectives of the CAU, assisted in creating formats for future bulletins/reports, and most importantly, helped formulate the crime analysis action plan. This plan was, and still is, a critical document designed to guide the CAU in its endeavors.

The infrastructure of the CAU was built with the best available hardware, software products, and people power. The software still used in the CAU today includes: Microsoft Word, Access, Excel, and PowerPoint as well as SPSS and MapInfo. Without access to a records management system, volunteers supported the CAU's crime database by reading, coding, and entering information from paper copies of residential and commercial burglary reports (crimes determined to be important by the User Committee) into an Access database. The database included information such as location of the crime, time of day, day of week, point of entry, method of entry, and property stolen.

Finally the CAU needed to obtain electronic maps. It was necessary to contact the city's GIS department to see if maps were available to avoid replicating work. The GIS team, which is housed in the city's advanced technologies division, provided the necessary street, subzone, and beat layers. In addition, because of Scottsdale's growth rate, new streets are being paved every day. The city's GIS team continuously updates the street files and provides them to the CAU as well as makes adjustments to the subzone and beat layers when appropriate.

Example

The CAU has, in the last few years, begun formally conducting tactical crime analysis. We purchased a software package specific to tactical crime analysis called Automated Tactical Analysis of Crime (ATAC) to assist in coding criminal incidents and identifying patterns and series. We also obtained CrimeStat to assist in cluster analysis. The map on the previous page is an example of a map in the weekly bulletin produced using MapInfo and CrimeStat. The purpose of the bulletin is to show where the clusters of crime are occurring to assist in the apprehension of criminals and in the clearance of cases. The map shows one of the three districts in Scottsdale. Even though districts are somewhat large, because criminals do not abide by beat or subzone boundaries, the entire district is displayed on the map. In addition to the map, the bulletin lists the time span, day of week, and crime type of each incident (not included here).

> "...let us keep focused on crime analysis, not mapping for the sake of mapping."

Conclusion

The Scottsdale Police Department's Crime Analysis Unit has grown from six volunteers to a staff of one supervisor, a crime analyst, two support services specialists, two part time interns, and one volunteer. To say the administrators have been supportive of crime analysis in Scottsdale is a major understatement. However, the Scottsdale Crime Analysis Unit could still use improvement. Putting a dot on a centerline map used to be awe-inspiring. Even shading one beat a different color than another could justify a color printer.

Today there are higher expectations of crime mapping and crime analysis. Our city's GIS resource has yet to be fully tapped. We have access to parcel maps, land use maps, aerial photographs, and many other layers. Not only that, but we, as crime analysts, need to do more with the geographic and other non-police information we do have to answer such questions as: What is the rate of residential burglaries per home? How does the crime change per beat when population values are included? Are corner houses more susceptible to burglary in my community? These are questions that have been answered by external researchers in the past. Now crime analysts have the capabilities to do this.

Although the GIS world is opening up our horizons, we cannot forget that these are only maps. Let us not forget the basic goals of crime analysis: deterrence, suppression, and apprehension. Obviously, crime mapping is a major component for crime analysis, but let us keep focused on crime analysis, not mapping for the sake of mapping. Let us help put the officer in the right place at the right time, let us assist in making criminals uncomfortable in a traditional hotspot, and let us show with our analytical capabilities the need for additional officers. Finally, let us do that not only with the technology at our fingertips, but more importantly, with our own analytical experience.

Paul Bentley is supervisor of Scottsdale, AZ crime analysis unit. He can be reached at (480) 312-5095 or emailed at pbentley@ci.scottsdale.az.us.

NEXT ISSUE

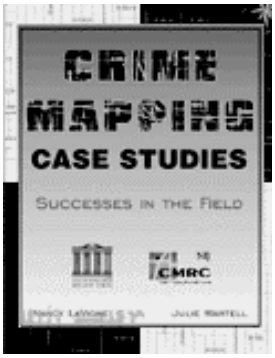
The topic of the next issue will be tactical crime analysis and crime mapping; that is, the use of mapping in analyzing crime for short-term crime patterns, series, hotspots, etc. We look forward to your participation in submitting articles for the upcoming issue.

If you are interested in contributing to the next issue or any future issue, please contact Rachel Boba at:

rboba@policefoundation.org
or at (202) 721-9777.

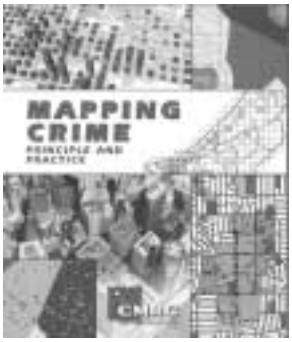
Also, look for a crime mapping software survey in next quarter's issue. We would appreciate your participation. It will be inserted within the newsletter. We will also be posting it on the crimemap listserv (crimemap@aspensys.com). The topic of the survey will be customized mapping applications for police departments. From this survey we hope to put together a compilation of customized software products available commercially and publicly.

Book Reviews



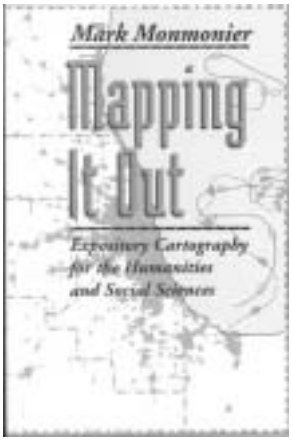
Crime Mapping Case Studies: Successes in the Field (Volume 2) **New!**
Nancy LaVigne & Julie Wartell, eds., 2000, 140 pages, Product #841, ISBN #1-878734-71-1
PERF Member Price: $18, Non-member Price: $20

Hot off the press, this second PERF-CMRC volume of crime mapping case studies meets increasing demands for practical information on how crime mapping technologies can be applied to community and police agency problems. It highlights such issues as gun violence, drug crackdowns, neighborhood watch efficacy, identifying serial suspects, sex offender registrant compliance, gang suppression, police agency redistricting/staffing, and many more. Written by practitioners, this volume is a must-read for students, police professionals, policymakers and others interested in accurate information that supports crime control and community policing, aids in suspect apprehension and prosecution, and improves law enforcement operations.



Mapping Crime: Principle and Practice **New!**
Keith Harries, National Institute of Justice Publication, December 1999
To download this book for free, see the Crime Mapping Research Center's web site at http://www.ncjrs.org/html/nij/mapping/pdf.html. To order a hard copy of the book, send an e-mail to: puborder@ncjrs.org, order document number NCJ 178919 or contact the National Criminal Justice Reference Service at 1-800-851-3420, P.O. Box 6000, Rockville, MD 20849-6000.

Mapping Crime: Principle and Practice is geared toward law enforcement personnel who are in the early stages of using geographic information systems (GIS), and it details numerous ways that this technology can be effectively used. This comprehensive guide features a variety of topics from the history and theoretical perspectives on crime mapping to the future of GIS including geographic profiling, forecasting, high-resolution GIS, digital aerial photography, and global positioning systems (GPS). Perhaps the most important aspect of this guide is a very thorough discussion of the issues involved in creating crime maps for a variety of law enforcement audiences (patrol, investigations, management, community organizations, policy makers, etc.). Other topics covered include geocoding, aggregating data, hot spots, buffering, map design, and spatial analysis. Additionally, Dr. Harries ends with an extensive list of Internet resources for crime mapping which allows the readers to learn more about topics discussed in the text. Overall, this is an excellent resource for police practitioners and academics alike.



Mapping It Out: Expository Cartography for the Humanities and Social Sciences
Mark Monmonier, University of Chicago Press, 1993

Mapping It Out is a text for those interested in gaining an overall understanding of basic cartographic principles. As the subtitle indicates, this book is geared toward scholars in the social sciences; however, the cartographic techniques discussed are applicable to anyone interested in creating thoughtful, effective maps. Spatial patterns, communication goals, data scaling and classification, mapping movement and change, and the use of relational maps are examples of issues discussed in this text. Other sections address more fundamental cartographic issues such as map scale, cartographic symbols, typography, and labeling.

The COPS Internet — Information on COPS and Community Policing is just a CLICK away

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Upcoming Conferences and Training

April

MapInfo's Seventh Annual Worldwide User Conference
April 30-May 3, 2000
San Antonio, TX
http://www.mapinfo.com/events/conferences/mapworld_00/index.html

May

13th Annual Geographic Information Sciences Conference
May 1-4, 2000
Baltimore Convention Center
Baltimore, MD
http://www.towson.edu/cgis/tugis2000.html

IACP: Introduction to Crime Analysis
May 24-26, 2000
St. Charles, MO
Tuition: IACP Members $360
Non-members: $460
Contact: Beth McKenna Currier 1-800-THE IACP

Massachusetts Association of Crime Analysis Annual Training Conference
May 2-5, 2000
SeaCrest Conference Center, Falmouth
Cape Cod, MA.
http://www.ableweb.com/maca/index.html

June

Twentieth Annual ESRI International User Conference
June 26-30, 2000
San Diego, CA
http://www.esri.com/events/uc
(909) 793-2853

July

Annual Conference on Criminal Justice Research and Evaluation
July 16-19, 2000
JW Marriot Hotel
Washington, DC

General Web Resources for Training Seminars and Conferences

http://www.urisa.org/meetings.htm
http://www.ifp.uni-stuttgart.de/ifp/gis/conferences.html
http://www.geoinfosystems.com/calendar.htm
http://msdis.missouri.edu/usergroup.html
http://magicweb.kgs.ukans.edu/magic/magic_net.html
http://www.nsgic.org/
http://www.mapinfo.com/events
http://www.esri.com/events

Early Reminder!!!!

Fourth Annual International Crime Mapping Research Conference
December 9-12, 2000
San Diego, CA

Registration Available at www.nijpcs.org/upcoming.htm

CALL FOR PAPERS
SUBMISSION DEADLINE: May 1, 2000
Submissions and questions should be directed to Eric Jefferis
Tel: (202) 616-7108
Email: jefferis@ojp.usdoj.gov
or Debra Stoe
Tel: (202) 616-7036
Email: stoed@ojp.usdoj.gov

Crime Mapping Research Center
National Institute of Justice
810 7th Street, NW
Washington, DC 20531

Web Site Reviews

Scottsdale, Arizona Crime Analysis Unit Web Page
http://www.ci.scottsdale.az.us/police/cau/cauindex.asp

This is a great web site that contains a wealth of information. The home page features a "go to" bar, which is essentially the table of contents, that allows the user to easily maneuver through the site. The site contains definitions of crime analysis as well as crime information, crime alerts, and links to other relevant web sites.

In particular, there are individual Part I crime maps for each beat for the most recent month that are accessed by just clicking on the appropriate area of a city map. In addition, the site contains a table with the number of individual UCR Part I crime for the years 1992 through 1999. The information shows totals by month, the percent change from year to year, the population for each year, and the crime rate per population for each year. Lastly, the page includes detailed information on recent auto theft, burglary from vehicle, and both residential and commercial burglary.

Jefferson Parish, Louisiana Sheriff's Office Web Site
http://www.jpso.com

The Jefferson Parish Sheriff's Office (JPSO) web site contains their customized Internet mapping software described in the first article of this issue. It can be accessed through the department's home page by clicking on the JPSO Crime Tracker link and choosing to view crime maps and statistics by civic association or zip code. After choosing civic association or zip code, the user is able to define a search by using pull down menus to select the specific area to be shown, the type of crime, the month, and the year. Once these selections are made, a map of the specific area is displayed, and the user can zoom in or out, pan, and identify the events depicted on the map.

The locations of schools and parks, and aerial photographs may be turned on and off. Clicking on a point event with the identity option provides the user information about that specific event including ID number, crime type, date, time , and location address (to the nearest 100 block; e.g. 124 W. Main St. is displayed as 100 W. Main St.). The map scale and map width (in miles) are shown and updated each time the map is redrawn. Another option is to create a report of the incidents depicted on the map. Clicking on the report feature returns a list of the incidents including the ID number, the date and time of each event, and the location address.

We are interested in highlighting your web site!

If your department or organization posts maps or has interactive maps on the web, please let us know. We will highlight your page in a future issue!

For contact information, see page 8.

ABOUT THE POLICE FOUNDATION

The Police Foundation is a private, independent, not-for-profit organization dedicated to supporting innovation and improvement in policing through its research, technical assistance, and communications programs. Established in 1970, the foundation has conducted seminal research in police behavior, policy, and procedure, and works to transfer to local agencies the best new information about practices for dealing effectively with a range of important police operational and administrative concerns. Motivating all of the foundation's efforts is the goal of efficient, humane policing that operates within the framework of democratic principles and the highest ideals of the nation.

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